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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/779,843

02/18/2004

Kevin G. Donohoe

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9432

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7590

05/31/2006

DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP

2101 L Street, NW

Washington, DC 20037

EXAMINER

KACKAR, RAM N

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/779,843		DONOHOE ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Ram N. Kackar		1763	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 53-63 and 75-86 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 53-63 and 75-86 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 53-61, 63 and 75-86 are rejected under 35 U.S.C. 102(e) and 102(a) as being anticipated by Collins et al (US 5888414).**

Collins et al disclose an inductively coupled plasma etching chamber with an electrode to support a substrate (Fig 1) and bias voltage arrangement (Fig 1-42 and Fig 16) which could be modulated to change bias voltage at will to control the etch rate (Fig 10). The bias voltage duty cycle could be in the range of 10-90% (Fig 12). The source power is disclosed capable of 1500 watts (Col 24 lines 54-55). Collins et al teach that the plasma chamber could alternatively be an ECR system (Col 2 lines 40-43), which could be operated at 2-3 milli torr (Col 3 lines 12-14). Further the bias voltage can have large range and is disclosed to have a value of 200-300 volts (Col 1 lines 25-35) and several other values depending upon intended use. Collins et al further disclose modulating (controlling to change) bias power (Fig 16-42).

Regarding the newly added limitation of etching rate and deposition rate being different on different location (depends upon aspect ratio), this is an intended use (functional limitation) of

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the structural facilities provided by the apparatus disclosed by Collins et al. Claimed process is however known from the prior art as discussed further.

Further, as discussed earlier, operating parameters claimed are intended use limitations, the apparatus is disclosed capable of supporting.

**3. Claims 53-61, 63 and 75-86 are rejected under 35 U.S.C. 102(e) as being anticipated by Hopkins et al (US 5888414).**

Hopkins et al disclose an inductively coupled plasma etching chamber with an electrode to support a substrate (Fig 11) and bias voltage arrangement (Fig 11-19, Fig 12-21 and Fig 13) which could be modulated to change bias voltage at will to control etch rate. The bias voltage duty cycle could be in the range of 0-100% (Fig 9). The source power is disclosed capable of 600-800 watts (Col 12 Table). Hopkins et al teach that the plasma chamber could alternatively be an ECR system (Col 2 lines 1-26), which could be operated at 3-4 milli torr (Col 12 Table).

Hopkins et al teach the application of bias voltage modulation for ARDE (Aspect Ratio Dependent Etching) and explains etching of high aspect ration by alternately etching and depositing (Col 10 lines 21-52 and Col 12 lines 54-67).

### ***Claim Rejections - 35 USC § 103***

**4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:**

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**5. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al (US 5888414) in view of Hashimoto et al (US 5779925).**

Collins et al disclose an inductively coupled plasma etching chamber with an electrode to support a substrate (Fig 1) and bias voltage arrangement (Fig 1-42 and Fig 16) which could be modulated to change bias voltage at will to control the etch rate (Fig 10). The bias voltage duty cycle could be in the range of 10-90% (Fig 12). The source power is disclosed capable of 1500 watts (Col 24 lines 54-55). Collins et al teach that the plasma chamber could alternatively be an ECR system (Col 2 lines 40-43), which could be operated at 2-3 milli torr (Col 3 lines 12-14). Further the bias voltage can have large range and is disclosed to have a value of 200-300 volts (Col 1 lines 25-35) and several other values depending upon intended use. Collins et al further disclose modulating (controlling to change) bias power (Fig 16-42).

Collins et al disclose control of bias by controlling the bias power but do not disclose modulation of source power.

Hashimoto et al disclose modulation of source power (Fig 5 and Col 9 lines 45- Col 10 line 16).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to be able to modulate source power in order to increase the range of process control.

### ***Response to Arguments***

Applicant's arguments filed 3/15/2006 have been fully considered but they are not persuasive. Applicant's arguments regarding disclosure of functional limitation in Collins et al has been discussed above.

Applicants other argument against disclosure of duty cycle in Collins et al is also not persuasive since Fig 12 discloses high and low bias which could be applied in any usable duty cycle. Hopkins et al also disclose Duty cycle and its effect on etch rate for different aspect ratio profiles.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N. Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571 272 1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ram Kackar  
Primary Examiner AU 1763